

WHAT IS CLAIMED IS:

1. A valve (1, 121, 700, 800, 400, 900, 990) comprising a body having first and second open ends 9(2, 3) and a passageway (4) for fluid between the ends, the first end 5 (2) including a first coupling means (54, 544, 540) for sealingly connecting the body about an opening (205) of a first external device (201) and a seal blocking an open area of the first end (2) which in use is placeable in register with the opening (205) of the external device (201), the valve (1, 121, 700, 800, 400, 900, 990) further including a seal displacement means movable within the body so as to interrupt the seal permitting fluid to 10 pass along the passageway (4) between the ends (2, 3), the coupling means (54) and the seal presenting a sterilisable mating surface for sealingly mating with a mating surface (216) about the opening (205) in the first external device, wherein the seal is formed between a first plastics portion movable by the seal displacement means and a second plastics portion disposed about the open area of the first end of the valve.
- 15 2. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in claim 1, wherein one of the plastic portions has a protruding sharp rim (15) and the other plastics portion of the seal has a curved surface area (22) so that when the valve (1, 121, 700, 800, 400, 900, 990) is in the closed position, the sharp rim (15) engages the curved surface area (22) and 20 displaces a portion of the curved surface area (22) thereby elastically deforming the materials of the sharp rim (15) and the curved surface area (22) to seal the opening of the valve (1, 121, 700, 800, 400, 900, 990).
- 25 3. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in Claim 2, wherein the engagement of the sharp rim (15) with the curved surface area (22) occurs during a linear motion of the sharp rim (15) relative to the curved surface area (22).
- 30 4. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in claim 2, wherein the body of the valve is manufactured from a plastics material.
5. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in claim 2, wherein the first plastic portion is integrally formed with the seal displacement means.

6. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in claim 2, wherein the first plastic portion is provided by a plastic plug (18) integrally formed with the seal displacement means.

5 7. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in claim 2, wherein the second plastic portion is integrally formed with the body of the valve.

8. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in claim 2, wherein the body of the valve is manufactured from a non plastic material.

10 9. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in claim 2, wherein the second plastic portion comprises a wall defining a bore portion (13) having a cross-section converging towards the first end (2) of the valve (1, 121, 700, 800, 400, 900, 990) which in turn leads to a wall defining a bore portion (14) having a substantially uniform cross-15 section which is located adjacent the first end (2) of the valve, the boundary between the wall defining the converging bore portion (13) and the wall defining the uniform bore portion (14) defining the sharp rim (15), the first plastic portion having a body portion (19) with a cross-section converging towards the first end (2) of the valve and leading to an end portion (20) with a uniform cross-section, the end portion (20) being adjacent the first 20 end (20) of the valve in use and a transitional surface between the external surface of the body portion (19) and the external surface of the end portion (20) of the first plastic portion defining the curved surface area (22) so that when the opening of the valve is sealed the sharp rim (15) engages the curved surface area (22) and displaces a portion of the curved 25 surface area (22) thereby elastically deforming the materials of the sharp rim (15) and the curved surface area (22).

10. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in claim 2, wherein the curved surface area (22) has a predetermined radius.

30 11. A valve (1, 121, 400, 900, 990) as claimed in Claims 1 to 10, in which the second end (3) of the body comprises a second coupling means (54, 544, 540) with a mating surface for sealingly connecting the body about an opening of a second external device.

35 12. A valve (1, 121, 400, 900, 990) as claimed in Claim 11, in which the distance between the mating surfaces of the first and the second coupling means (54, 544, 540)

remains unchanged during movement of the seal displacement means within the body between open and closed positions of the valve (1, 121, 400, 900, 990) so that in use the valve can connect mating surfaces about openings (205) of a first and a second external devices (201) separated by a distance equal to the distance between the mating surfaces
5 of the body.

13. A valve (700, 800) as claimed in Claims 1 to 10, in which the seal displacement means travels at least partially outside of the second end (3) of the body on actuation of the valve (700, 800).
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14. A valve (700, 800) as claimed in Claim 13, in which the displacement means comprise first and second ends (17, 53, 313, 312), the first end (17, 313) comprising the first plastic portion and the second end (53, 312) comprising a coupling means (554, 55, 557, 558) for sealingly connecting the displacement means about an opening (205) of a
15 second external device (201).

15. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in any of the preceding claims including means for displaying to a user the actuation state of the valve.
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16. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in any of the preceding claims, in which the body comprises a hollow housing (5, 50, 301, 302, 410, 905, 906) extending between the first and the second open ends.
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17. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in Claim 16, in which the seal displacement means comprises a piston (9, 19, 219, 309, 319, 329, 420) slidably movable within the housing, the piston having the first plastic portion formed at one end thereof.
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18. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in any preceding claim including an operating means for actuating the valve.

19. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in Claim 18, in which the operating means comprises an actuator (7, 117, 430) externally mounted on the body and movable between a first and a second end position, the actuator (7, 117, 430) being linked with the seal displacement means so that movement of the actuator (7, 117, 430) between

the first and the second end positions causes the seal displacement means to translate along the passageway between open and closed positions.

20. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in Claim 19, in which the
5 actuator (7, 117, 430) is linked with the seal displacement means via a cam pair.

21. A valve (1, 121, 700, 800, 400, 900, 990) as claimed in any preceding claim, in
which at least one guide element (211, 311, 419) is provided in the valve to prevent
rotational motion of the seal displacement means and to permit the seal displacement
10 means to move only linearly in the passageway.

22. A valve as claimed in any of the preceding claims, in which a seal is provided at
both the first and the second open ends of the body, each seal having a seal
displacement means movably disposed within the passageway of the body so that the first
15 and/or second ends may be sealed or opened.

23. A valve comprising a body having first and second open ends and a passageway
for fluid between the ends, the first end including a coupling means for sealingly
connecting the body about an opening of an external device and a seal blocking the open
20 area of the first end which in use is placeable in register with the opening of the external
device,

the valve further including a cam and follower arrangement for moving a seal
displacement means movable within the body comprising an actuator, positioned
concentrically about said body and rotatable about the axis of said body and having a pair
25 of shaped slots and a piston having a pair of opposing outwardly projecting pins wherein
each of said outwardly projecting pins are cooperatively engaged within said shaped slots
and wherein each of said shaped slots has a first section that is substantially parallel to
the longitudinal axis of said piston and a second section that is curved in a direction
substantially perpendicular to the longitudinal axis of said piston, the piston is provided
30 with a first plastics sealing plug movable by the seal displacement means into sealing
engagement with a second plastics portion disposed about the open area of the first end.

24. A valve as claimed in claim 23, wherein said first section contacts said pins from 0 to
56 degrees rotation of said actuator and said second section contacts said pins from 56 to
35 80 degrees rotation of said actuator.

25. A valve as claimed in claim 23 in which said seal displacement means is movable between a ready state in which said first and second plastics portions are in sealing contact and the valve is closed and a deployed state in which said first plastics portion is 5 displaced from contact with said second plastics portion and moved with the seal displacement means away from the mating surface so that the valve is open.

26. A valve as claimed in claim 23 in which the seal displacement means and said sealing plug are withdrawn into said coupling means as the seal displacement means 10 moves from the ready state to the deployed state.

27. A valve as claimed in claim 23 in which said actuator includes a safety lock means for preventing undesired movement of the seal displacement means.

15 28. A valve as claimed in claim 23 including visible or tactile indication means for indicating to a user the position of the valve between its ready and deployed states.

29. A valve as claimed in claim 23, wherein said seal displacement means includes a first and a second internal seal arranged concentrically between said body and said seal 20 displacement means, and longitudinally between said first and second open ends, wherein said first and second seal are separated by a distance parallel to the longitudinal axis of said displacement means.

30. A valve as claimed in claim 29, in which said distance separating said first and 25 second seal is less than the distance the seal displacement means moves from the ready state to the deployed state.

31. A valve as claimed in any of claims 23 to 30, in which the piston moves non- rotationally relative to the housing to open or close the valve.

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32. A valve (1, 121, 400, 900, 990) comprising a body having first and second open ends (2, 3) and a passageway (4) for fluid between the ends, the first end (2) including a first coupling means (54, 544, 540) with a first mating surface and the second end including a second coupling means (54, 544, 540) with a second mating surface, the first 35 and the second coupling means (54, 544, 540) being sealingly mateable with mating

surfaces about openings (205) of first and second external devices (201) respectively and a seal blocking an open area of the first end (2) which in use is placeable in register with the opening (205) of the first external device (201), the valve further including a seal displacement means movable within the body so as to interrupt the seal permitting fluid to

5 pass along the passageway (4) between the ends, the first mating surface and the seal presenting a sterilisable surface, wherein the distance between the first and the second mating surfaces of the valve remains unchanged during movements of the seal displacement means within the body.

10 33. A valve as claimed in Claim 32, in which the body comprises a hollow housing (5, 301, 410, 905, 906) extending between the first and the second open ends.

34. A valve as claimed in Claim 32 or Claim 33, in which the seal displacement means comprises a piston (9, 309, 420) slidably movable within the housing (5, 301, 410, 905, 15 906).

35. A valve as claimed in any of Claims 32 to 34 including an operating means for actuating the valve.

20 36. A valve as claimed in Claim 35, in which the operating means comprises an actuator (7, 117, 430) externally mounted on the body and movable between a first and a second end position, the actuator (7, 117, 430) being linked with the seal displacement means so that movement of the actuator (7, 117, 430) between the first and the second end positions causes the seal displacement means to translate along the passageway 25 between open and closed positions.

37. A valve as claimed in Claim 36, in which the actuator (7, 117, 430) is linked with the seal displacement means via a cam pair.

30 38. A valve as claimed in any of Claims 32 to 37, in which at least one guide element (211, 311, 419) is provided in the valve to prevent rotational motion of the seal displacement means and to permit the seal displacement means to move only linearly in the passageway.

39. A valve as claimed in any of Claims 32 to 38 including means for displaying to a user the actuation state of the valve.

40. A valve as claimed in any of Claims 32 to 39, in which a seal is provided at both the 5 first and the second open ends of the body, each seal having a seal displacement means movably disposed within the passageway of the body so that the first and/or second ends may be sealed or opened.

41. A valve (400, 900, 990) comprising a body having first and second open ends and a 10 passageway (403) for fluid between the ends, the first end including a first coupling means (540) with a first mating surface and the second end including a second coupling means (540) with a second mating surface, the first and the second coupling means (540) being sealingly mateable with mating surfaces about openings (205) of a first and a second external devices (201), in which first and second seals are provided for removably 15 blocking open areas of the first and the second ends, respectively, which in use are placeable in register with the openings (205) of the first and the second external devices (201), the valve (400, 900, 990) further including a pair of seal displacement means (420) movable within the body so as to interrupt at least one of the seals permitting fluid to pass along the passageway (403) between the ends, the first mating surface and the first seal 20 presenting a first sterilisable surface, and the second mating surface and the second seal presenting a second sterilisable surface.

42. A valve (400, 900, 990) as claimed in Claim 41, in which the body comprises a 25 hollow housing (410, 905, 906) extending between the first and the second open ends.

43. A valve (400, 900, 990) as claimed in Claim 41 or Claim 42, in which the seal displacement means comprises a piston (420) slidably movable within the housing (410, 905, 906).

44. A valve (400, 900, 990) as claimed in any of Claims 41 to 43 including an 30 operating means for actuating the valve.

45. A valve (400, 900, 990) as claimed in Claim 44, in which the operating means comprises at least one actuator (430) externally mounted on the body and movable 35 between a first and a second end position, the actuator (430) being linked with at least

one of the seal displacement means so that movement of the actuator (430) between the first and the second end positions causes the seal displacement means to translate along the passageway (403) between open and closed positions.

- 5 46. A valve (400, 900, 990) as claimed in Claim 45, in which the actuator (430) is linked with the seal displacement means via a cam pair.
47. A valve (400, 900, 990) as claimed in any of Claims 41 to 46, in which at least one guide element (419) is provided in the valve to prevent rotational motion of the seal displacement means and to permit the seal displacement means to move only linearly in the passageway.
- 10 48. A valve as claimed in any of Claims 44 to 47 including means for displaying to a user the actuation state of the valve.
- 15 49. A valve as claimed in any of Claims 44 to 48 wherein the distance between the first and the second mating surfaces of the valve remains unchanged during movements of the seal displacement means within the body.